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US nuclear expert takes energy post

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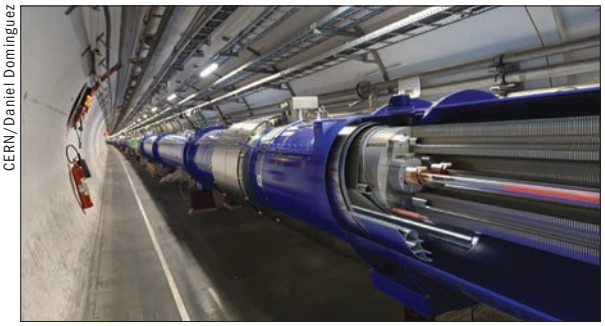
Particle physics

CERN readies itself for LHC restart

CERN's 27 km Large Hadron Collider (LHC) is gradually restarting after being shut down for 16 months following a major maintenance and upgrade programme. CERN scientists hope that the upgrade – costing SwFr 150m (€124m) – will now boost the energy of the collider to the full design energy of 13 TeV.

The LHC has been out of action since February 2013 when it was turned off following a successful three-year run operating at 7 TeV. Although the collider was not running at its full design energy of 13 TeV, this was enough to enable scientists in July 2012 to announce the detection of the elusive Higgs boson particle, which had first been theorized in 1964 and led to François Englert and Peter Higgs sharing the 2013 Nobel Prize for Physics.

Having now upgraded the accelerator, which involved consolidating some 10 000 superconducting magnet interconnections, CERN will now methodically restart the LHC step by step and conduct tests before the planned resumption of full operations next year. Early last month CERN began to power up the Super Proton Synchrotron (SPS), which feeds the LHC with protons. In mid-August the antimatter physics programme will restart at the Antiproton Decelerator, while the physics programme at the SPS will begin again in October. From early 2015 the beam will be back at the LHC and in spring 2015 the physics programme will restart.



CERN/Daniel Dominguez

Powering up
CERN has announced a restart schedule for the Large Hadron Collider following an upgrade and maintenance programme.

"The machine is coming out of a long sleep after undergoing an important surgical operation," says Frédérick Bordry, CERN's director for accelerators and technology. CERN's main objective for next year is to run the LHC at 13 TeV – a level that it is hoped will enable deeper studies of the Higgs boson and hunt for supersymmetric particles.

Ned Stafford

Facilities

Three dark-matter projects win US approval

Three "second generation" dark-matter projects that will be at least 10 times more sensitive than existing experiments have won the backing of the US Department of Energy and the National Science Foundation. The agencies announced last month they would fund the Super Cryogenic Dark Matter Search (SuperCDMS), the LUX-ZEPLIN (LZ) experiment and an upgrade to the Axion Dark Matter Experiment (ADMX-Gen2). The three detectors were chosen from a shortlist of five based on the advice of an international panel of experts.

The ADMX-Gen2 is an upgrade to the existing ADMX experiment at the University of Washington, which is hunting for a dark-matter candidate particle known as an axion, while LZ and SuperCDMS will look for weakly interacting massive particles (WIMPs). SuperCDMS, which will be based at the SNOLAB underground lab in Ontario, Canada, will be particularly good at looking for light WIMPs with masses lower than 10 GeV.

Matthew Kapust/Sanford Lab

Physics goldmine
The LUX-ZEPLIN dark-matter search will be located deep underground in a goldmine in South Dakota.

The LZ experiment is a joint project between the UK-based ZEPLIN collaboration, which has run three dark-matter experiments at the Boulby mine during the past decade, and the US-based LUX experiment at the Sanford Underground Research Facility in South Dakota. It is planned that the LZ will also be based in South Dakota when built.

"While the SuperCDMS is wonderful at detecting dark-matter candidates with low masses, the LZ has unprecedented sensitivity across the scale," says Chamkaur Ghag from University College London, who was involved in ZEPLIN and now works on both LUX and LZ. Ghag adds that UK researchers also picked the LZ detector last year as its top dark-matter experiment.

Tushna Commissariat

Sidebands

ESO

Superscope site blown up
The top of a 3 km-high mountain in the northern Chilean Andes has been blasted away to create a plateau for the European Extremely Large Telescope (E-ELT). The peak in Cerro Armazones was reduced by 40 m with about a million tonnes of rock blown off. When complete in the early 2020s, the E-ELT will feature a 39 m diameter primary mirror that will allow it to capture 15 times more light than any other optical telescope currently in existence.

US nuclear expert takes energy post
US president Barack Obama has nominated Elizabeth Sherwood-Randall, an expert in nuclear weapons and non-proliferation strategy, as the new deputy secretary of energy – the number two position in the US Department of Energy. With degrees in international relations from both Harvard and Oxford universities, Sherwood-Randall is currently head of nuclear proliferation and defence policy for the National Security Council. She also worked on the administration's plans to reduce the US arsenal of nuclear weapons and was a founding senior adviser to the Preventive Defense Project – an initiative between Harvard and Stanford universities that focuses on security threats. If her nomination is approved by the US Senate, she will become deputy to the current US energy secretary, physicist Ernest Moniz.

Setback for comet probe reboot
A crowd-funded effort to retrieve NASA's International Sun-Earth Explorer-3 (see July p13) hit a problem last month when the thrusters ran out of nitrogen gas. The gas is used to pump hydrazine into a reaction chamber to provide power for the craft, which is designed to study comets. The group successfully restarted the probe's engines in June by giving it 63 "burns" in total to shift the craft's trajectory, but the engines then unfortunately failed to fire. The team raised more than $160 000 to reboot the probe, which continues to transmit data, with the team remaining confident that it can find a way around the problem.